Small Business Innovation Research/Small Business Tech Transfer

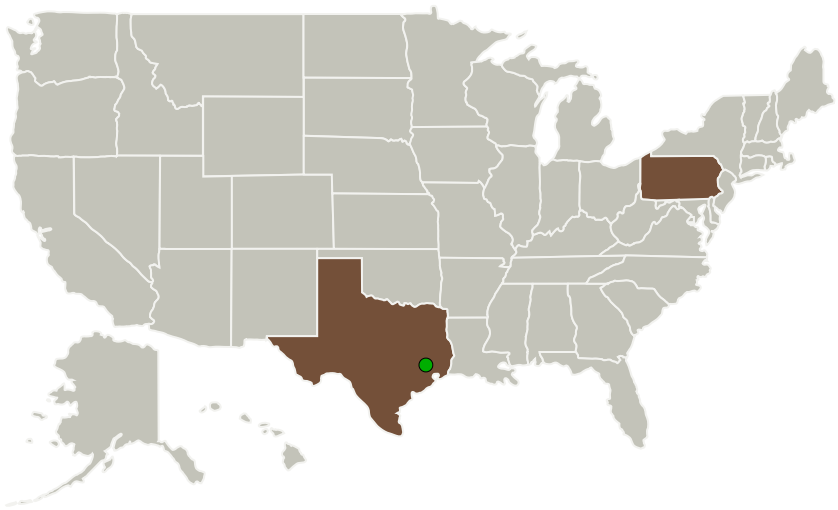
STARwatch to Deliver Objective Sleep Measures for Spaceflight Operations, Phase I

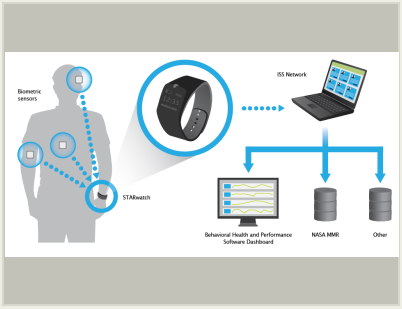
Completed Technology Project (2014 - 2014)

Project Introduction

This project will achieve a wrist-worn actigraphy device called STARwatch, designed specifically for space exploration environments. It will provide a minimally obtrusive, objective measure that evaluates astronaut sleep-wake activity and light exposure. This project will leverage our second generation actigraphy device that has already been validated in controlled laboratory experiments against gold-standard polysomnography. The compact wrist-worn device includes sensors to collect sleep metrics and will also serve as a wireless hub to collect real-time physiological data from other body-worn sensors (e.g., heart rate, EEG). It will use standardized wireless communication protocols (e.g., Bluetooth) to automatically uplink data to the ISS network (no astronaut time required). Data will automatically be integrated into medical operations support systems (e.g., BHP-Dashboard) to provide immediate feedback to astronauts and flight surgeons to aid in decision-making relative to astronaut medical, behavioral health and performance issues. During Phase I, we will develop an enhanced STARwatch, integrate data from other body worn sensors (e.g., heart rate sensor), demonstrate automatic data streaming using approaches compatible with the ISS network environment, and develop a plan for operational validation and spaceflight certification that will be implemented during Phase II (Phase I TRL of 4-5).

Primary U.S. Work Locations and Key Partners





STARwatch to Deliver Objective Sleep Measures for Spaceflight Operations Project Image

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Organizations Performing Work	Role	Type	Location
Pulsar Informatics Inc	Lead Organization	Industry	
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Pennsylvania	Texas

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139370)*

Images

Project Image
STARwatch to Deliver Objective Sleep Measures for Spaceflight Operations Project Image *(https://techport.nasa.gov/image/125973)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Pulsar Informatics Inc

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Daniel Mollicone

Co-Investigator:
Daniel Mollicone

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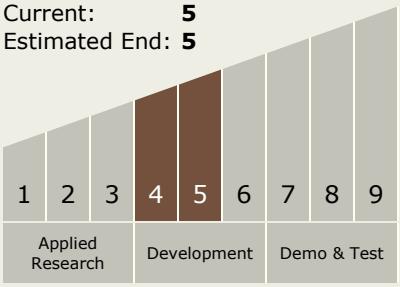
Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.3 Behavioral Health and Performance

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System